American Journal of Medical Genetics 70:48–51 (1997)

*Brief Clinical Report*

# **Severe Limb Abnormalities:** Nievergelt or New Syndrome?

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**Since the characteristic mesomelic limb abnormalities of the autosomal-dominant Nievergelt syndrome (NS) may be casually nonspecific, we are unsure whether our patient with these abnormalities but also with severe, symmetrical hand and foot anomalies has an unusual form of Nievergelt syndrome or a previously apparently undescribed syndrome. This infant's condition could represent an autosomal-dominant new mutation, or an autosomal or X-linked recessive disorder. Am. J. Med. Genet. 70:48–51, 1997.** © 1997 Wiley-Liss, Inc.

**KEY WORDS: mesomelic dysostosis; Nievergelt syndrome; acromelic malformation; sporadic occurrence oligo/syndactyly**

## INTRODUCTION

Nievergelt syndrome (NS) is a rare form of mesomelic dysostosis with characteristic clinical and diagnostic radiographic findings [Nievergelt, 1944; Hess et al., 1978]. We report on an infant with NS-like mesomelic changes but who also had severe hand and feet abnormalities.

## CLINICAL REPORT

This boy is the first child of young, Slovakian parents who are third-degree relatives. His mother was 19 and his father 22 years old, both in good health. Family history was unremarkable. Pregnancy and delivery at 40 weeks of gestation were uneventful. Birth weight, length, and head circumference (OFC) were 3,120 g, 43 cm, and 34 cm, respectively. Apgar scores were 10 at 1 and 5 min, respectively.

The infant was referred because of shortness and limb anomalies. There was mesomelic shortness of the limbs with dimples above the lateral malleolus. There were oligo- and syndactyly, with only three fingers and four toes present. There was asymmetry of the face with the left corner of the mouth being lower, long upper lip, broad alveolar ridges, and retrognathia. The ears appeared low-set. Hair was sparse (Fig. 1A–C). Results of routine blood and urine examinations and intrauterine infection tests were normal. The karyotype was 46,XY. Brain and kidney ultrasound findings were normal.

On radiographic examination, the fibulae and the ulnae were more severely affected than the tibiae and the radii. Three small, malformed metacarpals and phalanges were present in the hands, and four in the feet. The second metatarsal was triangular in shape (Fig. 2A–C). The rest of the skeleton was normal.

## DISCUSSION

NS is characterized by mesomelic shortness of the limbs, with bony protuberances in the legs and dimples at the lower medial and lateral aspects of the legs. Clubfeet with equinovarus deformity are often present. Extension at the elbows and supination of the forearm bones is limited [Nievergelt, 1944; Hess et al., 1978]. Accordingly to Kaitila and Greenhaw [1990], no associated abnormalities are known to exist. Our patient had severe symmetrical hand and foot anomalies, i.e., oligo- and syndactyly, abnormal face, bony ridge along the lateral aspect of the hard palate, apparently low-set ears, and sparse hair.

The radiographic findings of NS consist of shortness and triangular or rhomboid shape of the tibiae and radii, and to a lesser degree of the fibulae and ulnae. Synostosis with dislocation or subluxation of the proximal forearm bones and synostosis of the tarsal and carpal bones occur in older children and adults

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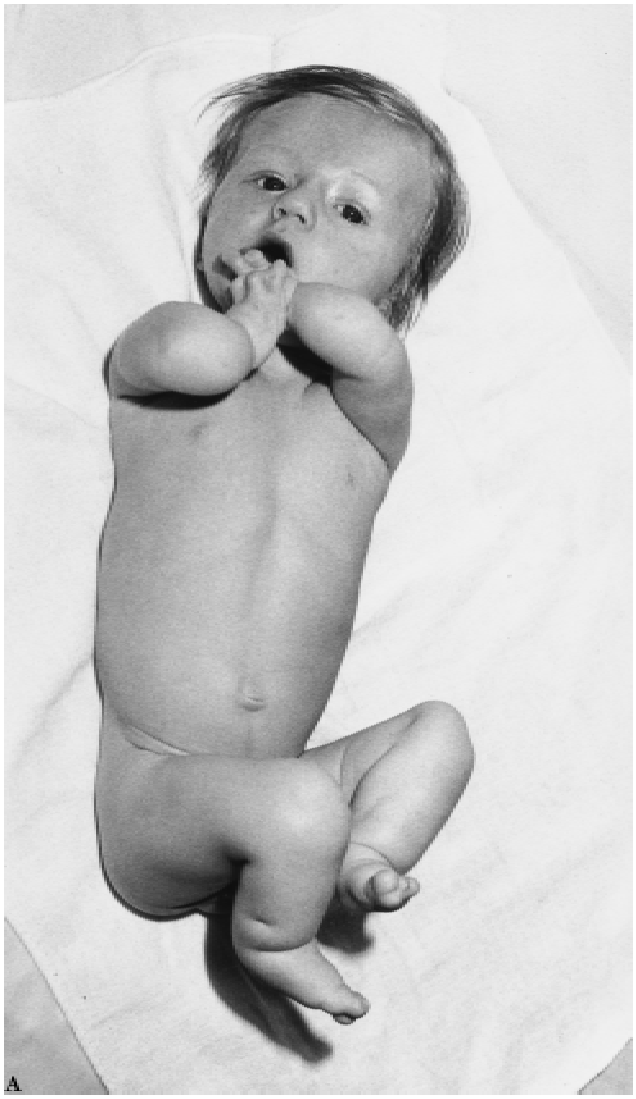
Received 20 February 1996; Accepted 30 August 1996



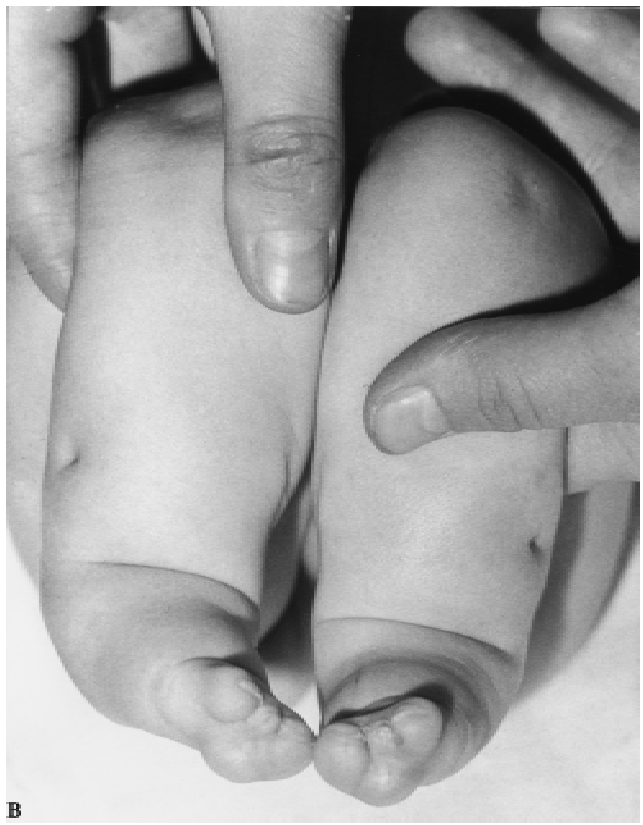


Fig. 1. Clinical findings in the patient. **A:** Legs and forearms are short and deformed. Note malformed hands and feet. **B:** Malformed feet. Note syndactyly and oligodactyly. **C:** Malformed right hand. Note syndactyly and oligodactyly.


Fig. 2. Radiographic findings at birth. **A:** Hypoplastic/malformed lower leg bones. Note triangular shape of the fibula. **B:** Hypoplastic/malformed forearm and short tubular bones of the hand. Note triangular shape of the right radius and left ulna. **C:** Hypoplastic/malformed short tubular bones. Note half-oval shape of the second metatarsal.

[Spranger et al., 1974]. Brachydactyly and clinodactyly may be present, but severe digital abnormalities have not been reported [Maroteaux, 1995]. There is considerable variability of X-ray findings, and the fourth patient of Nievergelt [1944] showed at age 2 months marked shortness and broadening of the tibiae and bowing of the fibulae, radii, and ulnae, but little of the rhomboid appearance. Regression of the rhomboid anomaly with age occurs regularly, which may make diagnosis later in life more difficult. In our patient, the fibulae and ulnae were more severely affected than the tibiae and radii. Most unusual was the triangular shape of the second metatarsal. There is exceptionally good demonstration of the fibular/ulnar developmental field, with remarkably similar corresponding involvement of ulnae and fibulae. The lateral and axial foot rays and medial and axial hand rays were severely malformed, with relative sparing of the thumbs and first toes [Lewin and Opitz, 1986].

## Differential Diagnosis

The diagnosis of NS is not difficult, but problems may arise with the great variability in X-ray findings and the age-related regression of the triangular bone shape. Confusion with other types of mesomelic dysplasia is unlikely, as none of them show the rhomboid or triangular appearance of the forearm and leg bones [Kaitila et al., 1976]. Since our patient has no sibs, it is difficult to decide whether his apparent minor craniofacial anomalies are just that, i.e., normal variants, or true minor anomalies which may, in this case, repre-

sent pleiotropic manifestations of a syndrome. The mesomelic changes of NS are characteristic but probably casually nonspecific; hence, the child could have an unusual form of NS, which we think is less likely than a "new" syndrome, either due to an autosomal or X-linked recessive mutation or a dominant new mutation. Unless other investigators have compelling unpublished data to the contrary, we have counseled the parents of our patient that they face a 25% recurrence risk. NS is inherited as a dominant trait.

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